

Economic Policy Reform, Government Debt Guarantees, and Financial Bailouts

Philip L. Brock

A financial bailout may be a lagging indicator of a successful policy to offer financial guarantees to potential losers from reform—to gain their political support.



Summary findings

Economic policy reform that creates opportunities for new productive activities often shifts wealth from one set of agents toward another, creating reason for political pressure against the reform.

Brock explores how government financial guarantees secure the political support of the reform's "losers."

Government guarantees have two effects:

- They will probably lead to a bailout of some firms' obligations to debtholders. This bailout must be financed by taxes on the cash flows from old and new projects, and tax collection involves a resource cost.
- The existence of the guarantees distorts entrepreneurs' investment incentives by creating an incentive to invest in overly risky projects and not to invest in safe new projects.

Brock demonstrates that government guarantees on existing debt, combined with the use of junior secured debt to finance new projects, would mitigate the problem of underinvestment in safe projects and overinvestment in risky projects.

The potentially positive role of government financial guarantees after economic reform does *not* imply that prudential banking standards fail to apply during a period of economic reform. If anything, prudential standards are *more* important during such a period. But it does imply that a financial bailout may be a lagging indicator of a successful policy to offer financial guarantees to potential losers, so they will support reform.

This paper — a product of the Finance and Private Sector Development Division, Policy Research Department — was prepared for the seminar on "The Financial System: An International Perspective," held in San José, Costa Rica, September 1993. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Paulina Sintim-Aboagye, room N9-061, extension 38526 (28 pages). October 1994.

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Economic Policy Reform, Government Debt Guarantees, and Financial Bailouts*

Philip L. Brock

University of Washington, Seattle, WA 98195

***This paper was prepared for presentation at the Seminar on the Financial System: An International Perspective, San José, Costa Rica, September 1993. The revision has benefitted from seminar presentations at the University of British Columbia and the World Bank. I thank Herb Baer, Jerry Caprio, Mick Devereux, and Ross Levine for very helpful comments.**

Address for Correspondence: Philip L. Brock, Department of Economics, DK-30, University of Washington, Seattle, WA 98195 Phone: 206-543-5796 FAX: 206-685-7477 Internet: plbrock@u.washington.edu

1. Introduction

There is an historically important connection between economic policy reforms and financial bailouts. For example, periods of important economic reform in Korea in the 1960s and Chile in the 1970s were followed by significant government interventions in the financial systems that involved debt writedowns (in Korea following 1972 and in Chile following 1983). In the nineteenth century sustained movements toward free trade in the United States (following the 1852 Compromise Tariff Act) and Japan (following the forced opening of Japan in the 1850s) were also followed by financial crises (1839-1841 in the U.S. and 1872-76 in Japan). Other episodes of economic policy reform that have ended with financial bailouts include Chile (1956-1962), Brazil (1965-1971), and Argentina (1975-1981).

Early work on modeling economic policy reform often assumed the existence of an appropriate set of lump-sum taxes and transfers in order to focus on the welfare costs of various government policies. More recent work on economic policy reform -- including Fernandez and Rodrik (1991) and Alesina and Drazen (1991) -- has focused on the "winners" and "losers" of policy reforms. Models of winners and losers sidestep the issue of transfer mechanisms that would compensate losers in order to focus on the nature of noncooperative games that prevent heterogeneous groups of individuals from agreeing upon policy reforms. In many of these models potential winners are politically weak and cannot push through reforms that would be adopted if winners could make side payments to losers.

This paper concerns the design of a transfer mechanism to facilitate economic policy reforms. Unlike the literature on "winners" and "losers" of policy reforms, the paper assumes that *no* policy reform can take place if *any* agent is made worse off by the reform. Given this constraint, a government wishing to undertake a potentially pareto-improving policy reform must work within the parameters of the existing mechanisms for wealth redistribution without the benefit of lump-sum taxes and transfers.

The paper's model is built around a two-period endowment economy in which "nonentrepreneurs" lend to "entrepreneurs" to finance investment projects. A policy reform is assumed to lower revenue from projects already in existence, but also to create investment opportunities for new projects whose revenue would more than offset the lost revenue of the original projects. The government can compensate nonentrepreneurs for the added riskiness of the existing debt by providing a debt guarantee that is backed by

the government's ability to levy taxes. The government's guarantee has two consequences: first, with a positive probability the guarantee will lead to a bailout of firms' obligations to debtholders that must be financed by taxes on the cash flows of new and old projects, where tax collection involves a resource cost; and second, the existence of the guarantee will distort the investment incentives of entrepreneurs, creating an incentive not to invest in new projects or to invest in overly risky projects.

When choosing the mechanism to compensate nonentrepreneurs for the adverse effects of the new policy on the value of their debt, the government must decide whether or not to permit entrepreneurs to create new firms and, if not, whether to restrict new debt issued by existing firms to be equal in rank with old debt, to secure new debt by new cash flows, or to grant a risk-free guarantee to new debt. The optimal choice will minimize the deadweight cost of the transfer.

Section 2 develops the basic model. Section 3 shows how the government's guarantee distorts the entrepreneur's investment incentives. Section 4 discusses the use of secured debt to align the entrepreneur's incentives more closely with those of the government. Section 5 examines the effect of government guarantees on new debt as well as pre-existing debt. Section 6 sketches reform periods in Chile (1975-1983) and Meiji Japan (1872-1881) to illustrate the empirical applicability of the model. Section 7 concludes.

2. The Model

The model is a simple two-period general equilibrium endowment economy that is based on the microeconomic analysis of secured debt by James (1988, 1989). The general equilibrium setting of the paper is adapted from that of Bernanke and Gertler (1990). Unlike either James (1988, 1989) or Bernanke and Gertler (1990), there is a government in this paper whose policy choices form the focal point of the paper's analysis. In order to provide the *simplest* possible model to explore the public finance link between economic policy reform, government loan guarantees, and financial bailouts the paper assumes symmetric information between borrowers and lenders. *Caveats* concerning additional issues raised by asymmetric information are discussed at the end of the paper.

The first period is the investment period and the second period is the consumption period. There are a countable infinity of risk-neutral agents in the economy. Entrepreneurs are able to undertake risky

indivisible investment projects. Non-entrepreneurs cannot undertake risky investment projects. Agents in each class of individuals are assumed to be identical so that the analysis can be conducted in terms of a single, representative price-taking entrepreneur and a single, representative price-taking nonentrepreneur. A representative entrepreneur begins period 1 with an endowment $w_e < 1$ invested in a project that has a payoff of $a_1(s)$ in period 2. The state of the world s is assumed to have a uniform distribution over the interval $[0, \bar{s}]$. The required investment for the project is one unit of endowment so that the entrepreneur must obtain additional financing for the project from the nonentrepreneur. This borrowing can be thought of as being channeled through a bank holding company such as a Japanese *zaibatsu* or a Latin American *grupo económico*. A representative nonentrepreneur begins period 1 with an endowment w_n that is divided between debt (d) in the entrepreneur's project and investment $(w_n - d)$ in a safe technology that pays a gross return r_f in period 2 on any amount stored.¹ Output of either the risky project or the safe investment technology is the consumption good for period 2.

Given the assumption of risk-neutrality, the expected payoff to the nonentrepreneur must equal the risk-free return r_f :

$$\int_0^{\bar{s}} \min[r_d(1-w_e), a_1(s)] f(s) ds = r_f(1-w_e) \quad (1)$$

where r_d is the contracted rate on debt. The expected period 2 income of a representative entrepreneur is

$$E(y_e) = \int_0^{\bar{s}} a_1(s) f(s) ds - r_f(1-w_e) \quad (2)$$

while the expected period 2 income of a representative nonentrepreneur is:

$$E(y_n) = \int_0^{\bar{s}} \min[r_d d, a_1(s)] f(s) ds + r_f(w_n - d) = r_f w_n, \quad (3)$$

where $d = 1 - w_e$. Equation (2) says that the entrepreneur's expected income is the expected residual cash flow from the project after the nonentrepreneur has been paid. Equation (3) says that the nonentrepreneur's

¹ Alternatively, the nonentrepreneur could hold some other form of state-contingent claim on the entrepreneur that yields the expected risk-free return. The key distinction in this model is between internal and external finance, not on whether the financial contract takes a particular form of debt or equity.

expected income is the risk-free gross return on his endowment, part of which is invested in the risky project and part of which is invested in the riskless technology.

In period 1 the government has an option to undertake an economic policy reform.² I assume that a change in government policy will lower the expected period 2 cash flow from the existing project:

$$\int_0^{\bar{s}} a_1^*(s) f(s) ds - \int_0^{\bar{s}} a_1(s) f(s) ds < 0 \quad (4)$$

where $a_1^*(s)$ is the cash flow in state s following the policy change. An unexpected policy reform will result in a loss in the value of the debt issued by the representative entrepreneur:

$$\int_0^{\bar{s}} \min[r_d(1-w_e), a_1^*(s)] f(s) ds \leq r_f(1-w_e) \quad (5)$$

In order for the representative nonentrepreneur to agree initially to invest in the first project he must be given a guarantee that he will be compensated for losses arising as a result of changes in economic policy. I will assume that the representative entrepreneur and nonentrepreneur have agreed upon constitutional safeguards that require the government to make such compensation.³

The government has the authority to order the private recontracting of the existing debt contract in conjunction with the proposed policy reform. If the reduction in the cash flow on the existing project is not too large, an upward recontracting of r_d will compensate the nonentrepreneur for the lower cash flow and greater default probability of the project. In this case, there is no additional role for public policy to supplement the initial economic reform. In what follows, I will assume that the expected value of the new cash flow is strictly less than the riskless rate so that recontracting *will not* solve the distributional problem associated with the policy reform:

²I will not attempt to model why the government would not have undertaken a reform prior to the start of period 1. By now there is a large literature on policy reform [see, e.g., Krueger (1990) for a survey] that stresses the difficulty of defining "the government" as a benevolent guardian. Even when a government is attempting to maximize welfare, it may pursue policies due to "government failure" that are not the best policies. Some governments do, however, enact policy reforms that have the potential to improve welfare if the private sector can be persuaded to undertake new investments that follow the lead of the government.

³With reference to footnote 1, this means that the agents can write financial contracts, including simple debt contracts, that are contingent on the state of nature s , but that they cannot write contracts contingent on specific policy changes. The pareto criterion is a simple rule that solves a potential time consistency problem with respect to policy reforms.

$$\int_0^{\bar{s}} a_1^*(s) f(s) ds < r_f(1 - w_e). \quad (6)$$

As a result of this assumption, the government will be obliged to engineer a transfer to the representative nonentrepreneur to make him no worse off than he was before the policy change.

Benchmark Analysis: Financing of the New Project by a New Firm

As a starting point for the analysis of the mechanics of the transfer, I assume that the government cannot take over the management of the bankrupt bank holding company (only the entrepreneur has the knowledge to generate positive cash flows from the project). In order to make the representative nonentrepreneur no worse off as a result of the policy change, the government guarantees the risk-free rate of return on outstanding debt, thereby incurring the following financial obligation:

$$V_0(s) = r_f(1 - w_e) - \min[r_f(1 - w_e), a_1^*(s)] = \max[0, r_f(1 - w_e) - a_1^*(s)]. \quad (7)$$

Equation (7) states that as long as the cash flow of the first project exceeds the nonentrepreneur's claim on the project the government's obligation is zero. Whenever the cash flow of the first project falls short of the claim of the nonentrepreneur, the government's guarantee obligates the government to pay the difference. Equation (7) produces a standard result (e.g., Merton 1977) that the government's guarantee is equivalent to a put option written on the value of the entrepreneur's assets, where the value of the nonentrepreneur's debt claim is the exercise price of the option. Table 1 presents the balance sheet for the original firm with the government's guarantee in place. The guarantee is an asset of the firm and is the reason the firm has a positive net worth, denoted by $q_0 w_e$, where q_0 is the ratio of the market value of the firm to the book value of the firm (w_e).

Given the government's guarantee the representative entrepreneur will create a new bank holding company to finance the new project. Under the assumption that the amount of the nonentrepreneur's

endowment remaining in storage exceeds the amount required for investment in the new project, the rate on new debt (r_b) must satisfy the following no-arbitrage condition:

$$\int_0^{\bar{s}} \min[r_b, a_2(s)] f(s) ds = r_f, \quad (8)$$

where $a_2(s)$ is the cash flow in state s of the new project. In order to finance the government's guarantee on debt corresponding to the first project, the government taxes the representative entrepreneur with a state-dependent head tax of $T_0(s)$. Due to costs of tax collection the government's revenue from the tax is only $(1 - \gamma)T_0(s)$, where γ is a multiplicative parameter measuring the deadweight cost of taxation.

There will be states of the world in which the government's guarantee to the nonentrepreneur will exceed its capacity to tax the entrepreneur's cash flows. To cover those states the government must purchase a put option from the nonentrepreneur paying $\max[0, V_0(s) - (1 - \gamma)T_0(s)]$. The government finances the put option in the second period with a state contingent premium $p[V_0(s), T_0(s)]$ that is payable in states of the world in which the option is not exercised. The need for the government to hold a put option indicates that the government's debt guarantee cannot be unconditional. If the government chooses to combine the put option with the existing debt, the existing debt will pay more than the riskless rate. In the advent of a sufficiently bad state of nature in the second period, the put option allows the government to write down part of the value of its obligation.⁴ The Appendix develops the mechanics of the government's budget constraint associated with the put option.

The expected deadweight cost associated with collection of tax revenue to finance the expected financial bailout will prevent the government from undertaking some policy reforms that it would otherwise undertake. Given the requirement that the government can only implement pareto-improving policy changes,

⁴A similar characterization is obtained by Lucas and Stokey (1983, p. 74) in the context of fiscal financing for a war that occurs with a positive probability in the future. Lucas and Stokey's solution is for the government to purchase state-contingent bonds from the private sector that pay \hat{a} in the event of a war and zero otherwise. These state contingent bonds are identical to put options. In Lucas and Stokey's example, the government pays for the state contingent bonds by issuing state contingent government debt that pays \bar{a} (financed with tax revenue) if there is *no* war and zero otherwise. The financing solution in this paper for the government's guarantee is similar to the one obtained by Lucas and Stokey for state-contingent wartime expenditure and, as Lucas and Stokey state, the solution "illustrates the risk-spreading aspects of optimal fiscal policy under uncertainty."

the cash flow from the representative new project $a_2(s)$ must exceed the sum of the cost of investment, the expected capital loss on the existing investment, and the deadweight cost of taxation:

$$\int_0^{\bar{s}} a_2(s) f(s) ds - r_f - \left[\int_0^{\bar{s}} a_1(s) f(s) ds - \int_0^{\bar{s}} a_1^*(s) f(s) ds \right] - \gamma \int_0^{\bar{s}} T_0(s) f(s) ds \quad (9)$$

If the first three terms in equation (9) are positive, the new project will be welfare improving and a government with access to a lump-sum tax to finance the transfer to the nonentrepreneur should undertake the economic policy reform. Equation (9) indicates, however, that under the benchmark analysis of free entry of new firms the government will be forced to forego some potentially welfare-improving policy reforms due to the deadweight costs of tax collection.

3. Debt Financing of the New Project by the Existing Firm

As an alternative to the benchmark scenario, assume that the government constrains the representative entrepreneur to finance the new project from her existing bank holding company. The entrepreneur will then be forced to issue new debt that compensates the representative nonentrepreneur for the risk associated with the old debt of the firm:

$$\int_0^{\bar{s}} \min\{r_n, A_1 [a_1^*(s) + a_2(s)]\} f(s) ds = r_f \quad (10)$$

where r_n is the contracted rate on new debt and $A_1 = \frac{r_n}{r_f(1-w_e) + r_n}$ is the share of the firm's cash flows that

go to pay off the nonentrepreneur's new debt claim in the event of the firm's default.

The government's guarantee associated with the policy is the following:

$$\begin{aligned} V_1(s) &= r_f(1-w_e) - \min\{r_f(1-w_e), (1-A_1)[a_1^*(s) + a_2(s)]\} \\ &= \max\{0, r_f(1-w_e) - (1-A_1)[a_1^*(s) + a_2(s)]\} \end{aligned} \quad (11)$$

The expected value of the guarantee V_1 will be less than the expected value of the guarantee V_0 if the contracted rate on new debt (r_n) of the existing holding company is greater than the contracted rate (r_b) on debt when the entrepreneurs can set up a new financial firm. This will be true as long as the cash flow $A_1[a_1^*(s) + a_2(s)]$ going to pay off the representative nonentrepreneur's new debt in states of default is less than the cash flow $a_2(s)$ from the new project.

The government will finance the guarantee with a state-dependent head tax $T_1(s)$ on the entrepreneur. As in the benchmark case, the government purchases a put option from the representative nonentrepreneur for states of the world in which tax revenues fall short of the transfer associated with the debt guarantee.

When the interest rate on new debt issued by the existing firm exceeds the interest rate that would be contracted by a new firm, the entry restriction lowers the government's cost of compensating the nonentrepreneur for the policy change. By reducing the deadweight costs associated with tax collection, the restriction on entry may allow the government to undertake a policy reform that would be rejected by the criterion of equation (9). This will be the case if

$$\int_0^{\bar{s}} a_2(s) f(s) ds - r_f - \left[\int_0^{\bar{s}} a_1(s) f(s) ds - \int_0^{\bar{s}} a_1^*(s) f(s) ds \right] - \gamma \int_0^{\bar{s}} T_1(s) f(s) ds > 0. \quad (12)$$

Although a policy to restrict the financing of new projects to existing firms may lower the deadweight costs associated with financing the government's guarantee, the higher interest rate on new debt may cause the representative entrepreneur not to undertake the new investment. In particular, the entrepreneur will *not* invest in the new project if the following condition holds:

$$\begin{aligned} & \int_0^{\bar{s}} a_2(s) f(s) ds - \int_0^{\bar{s}} \min\{r_n, A_1[a_1^*(s) + a_2(s)]\} f(s) ds - \int_0^{\bar{s}} [V_0(s) - V_1(s)] f(s) ds \\ & = \int_0^{\bar{s}} a_2(s) f(s) ds - r_f - \int_0^{\bar{s}} [V_0(s) - V_1(s)] f(s) ds < 0. \end{aligned} \quad (13)$$

Equation (13) is the change in the entrepreneur's wealth resulting from her decision to invest in the new project when the new project must be financed by the existing financial holding company. The term $\int_0^T [V_0(s) - V_1(s)]f(s)ds$ represents the change in the expected value of the government's guarantee on old debt as a result of the investment. Since the second term in (13) is just the risk free rate, (13) indicates that the representative entrepreneur may not undertake the new project *even if* the cash flows are sufficient to cover the cost of the new debt.

Table 2 presents the balance sheet of the firm, showing the government's guarantee on old debt as an asset of the firm. The firm's net worth is denoted by $q_1 w_e$, and the change in the firm's net worth, $(q_1 - q_0)w_e$, is given by the terms in equation (13). When the inequality in equation (13) holds, new investment lowers the firm's net worth and the government is faced with a private sector underinvestment problem. This distortion of the entrepreneur's investment incentives is the same as the one first analyzed by Myers (1977) in the context of a firm. The underinvestment problem refers to decisions by owners of firms to forego positive net present value projects when the firms have outstanding debts. Myers shows in some detail that the underinvestment problem arises when new projects effect a wealth transfer from stockholders to bondholders by reducing the default risk of outstanding debt.

In this paper, the added cost of the new investment ($r_n - r_b$) -- produced by the prohibition on the creation of a new financial firm -- does not represent a direct transfer of resources to the nonentrepreneur, since the expected return to him is the risk-free return. The added cost of the new investment *does* create an expected transfer of resources from the entrepreneur to the government by lowering the expected size of the debt guarantee that the government must finance. Equations (12) and (13) together show that a pair of conditions interact to determine whether a potentially pareto-improving policy reform is feasible: a restriction on the creation of a new financial firm lowers the deadweight cost of tax collection by mixing the cash flow of the new project with that of the existing project, but this same restriction lowers the entrepreneur's incentive to undertake the new project.

Adding Risk to the New Project

Suppose, as in Gorton and Kahn (1992), that the entrepreneur can add risk to the new project at a cost C . Assume that the risk takes the form of a mean-preserving spread:

$$a_2^*(s) = a_2(s) + \varepsilon(s) \quad (14)$$

where

$$E[\varepsilon(s)|a_2(s)] = 0 \quad (15)$$

Given the cost of adding risk, the contracted rate on new debt of the holding company will be r_n^* if the entrepreneur decides to add risk to the project:

$$\int_0^{\bar{s}} \min\{r_n^*, A_2[a_1^*(s) + a_2^*(s) - C]\} f(s) ds = r_f \quad (16)$$

where $A_2 = \frac{r_n^*}{r_f(1-w_e) + r_n^*}$ is the proportion of cash flows of the holding company that go to the nonentrepreneur if the company defaults on its debt obligations.

If the entrepreneur decides to add risk to the new project, the value of the government's guarantee on existing debt will be the following :

$$\begin{aligned} V_2(s) &= r_f(1-w_e) - \min\{r_f(1-w_e), [1-A_2][a_1^*(s) + a_2^*(s) - C]\} \\ &= \max\{0, r_f(1-w_e) - [1-A_2][a_1^*(s) + a_2^*(s) - C]\} . \end{aligned} \quad (17)$$

The entrepreneur will choose to add risk when it is profitable to do so. Equation (18) gives the condition under which the entrepreneur will choose to add risk to the new project:

$$\begin{aligned}
& \int_0^{\bar{s}} a_2^*(s) f(s) ds - \int_0^{\bar{s}} \min\{r_n^*, A_2[a_1^*(s) + a_2^*(s) - C]\} f(s) ds - C - \int_0^{\bar{s}} [V_1(s) - V_2(s)] f(s) ds \\
& > \int_0^{\bar{s}} a_2(s) f(s) ds - \int_0^{\bar{s}} \min\{r_n, A_1[a_1^*(s) + a_2(s)]\} f(s) ds.
\end{aligned} \tag{18}$$

The first two terms on either side of the inequality in (18) are equal in value [from equations (9), (14) and (16)]. As a result, equation (18) can be rewritten as follows:

$$\int_0^{\bar{s}} [V_2(s) - V_1(s)] f(s) ds > C. \tag{19}$$

Equation (19) indicates that entrepreneur will find it profitable to add risk to the new project when the expected value of the increase in the government's guarantee produced by adding risk exceeds the cost of adding risk. The increase in the government's guarantee matches the decrease in the entrepreneur's profits that go toward paying off existing debt claims in states of default.

Table 3 presents the firm's balance sheet if the firm undertakes the risky investment. The firm's assets are lowered by the amount C by the choice of the risky investment, but the firm also has a new guarantee, V_2 , as an asset. The firm's net worth is denoted by $q_2 w_2$ and the condition that the firm's net worth increases as a result of the risky investment, $(q_2 - q_1)w_e > 0$, is the condition given by equation (19).

If the entrepreneur can add risk to the new project, the underinvestment problem associated with the entry restriction may be solved by risky investment, but only at a resource cost C . In addition, even when underinvestment in the project is not a problem in the absence of the riskier project, the ability to add risk may cause the entrepreneur to pick the riskier project.

4. Financing New Projects with Secured Debt

Smith and Warner (1979), Stultz and Johnson (1985), and James (1988,1989) have shown that the use of secured debt to finance new projects reduces the underinvestment problem by lowering the wealth transfer from shareholders to existing debtholders. In this paper's model, the government can similarly reduce the underinvestment problem created by the entry restriction by permitting the entrepreneur to issue junior secured debt. The return on junior secured debt (r_{sj}) must satisfy the following no-arbitrage condition:

$$\int_0^{\bar{s}} \min[r_{sj}, a_2(s)] f(s) ds = r_f. \quad (20)$$

With junior secured debt the cash flow of the new project secures the new debt, but the cash flow in excess of the contracted rate goes to the profits of the holding company, thereby lowering the expected cost of the government's guarantee below $V_0(s)$:

$$\begin{aligned} V_3(s) &= r_f(1-w_e) - \min\left\{r_f(1-w_e), \max[a_1^*(s), a_1^*(s) + a_2(s) - r_{sj}]\right\} \\ &= \max\left\{0, r_f(1-w_e) - a_1^*(s) - \max[0, a_2(s) - r_{sj}]\right\} \end{aligned} \quad (21)$$

$$\begin{aligned} V_0(s) - V_3(s) &= \\ &= \max[0, r_f(1-w_e) - a_1^*(s)] - \max\left\{0, r_f(1-w_e) - a_1^*(s) - \max[0, a_2(s) - r_{sj}]\right\} \geq 0. \end{aligned} \quad (22)$$

In equation (22), for example, if $r_f(1-w_e)$ were 100, $a_1^*(s)$ were 90, and $a_2(s) - r_{sj}$ were 5, then $V_0(s) - V_3(s)$ would equal 5.

If securing the new issue of debt eliminates the underinvestment problem, then the government will tax the entrepreneur with a state dependent head tax and simultaneously purchase a put option to cover the states of the world in which the obligation associated with the guarantee exceeds the government's tax receipts. Compared to the benchmark analysis, a limit on the creation of a new financial firm combined with the issue of junior secured debt offers an alternative that lowers the deadweight cost of tax collection. In

order for the new policy to be pareto superior to the status quo at the start of period 1, the following two conditions need to be satisfied:

$$\int_0^{\bar{s}} a_2(s)f(s)ds - r_f - \int_0^{\bar{s}} [V_0(s) - V_3(s)]f(s)ds \geq 0 \text{ and} \quad (23)$$

$$\int_0^{\bar{s}} a_2(s)f(s)ds - r_f - \left[\int_0^{\bar{s}} a_1(s)f(s)ds - \int_0^{\bar{s}} a_1^*(s)f(s)ds \right] - \gamma \int_0^{\bar{s}} T_3(s)f(s)ds > 0. \quad (24)$$

Condition (23) is required for the underinvestment problem by the entrepreneur not to occur. Table 4 shows that the change in the firm's net worth, $(q_3 - q_0)w_e$, is given by the three terms in equation (23). Condition (24) requires that the deadweight cost of taxation associated with the use of secured debt plus the expected capital loss on the existing representative project be less than the cash flow on the new project net of its finance cost.

5. Government Guarantees on New Debt

If the government permits the entrepreneur to establish a new firm and at the same time guarantees the debt issued by the new firm, the value of the government's obligation will be :

$$V_4(s) = \max[0, r_f(1 - w_e) - a_1^*(s)] + \max[0, r_f - a_2(s)]. \quad (25)$$

The value of this blanket guarantee will unambiguously exceed the benchmark guarantee with entry of the new financial firm. Because of the deadweight costs of tax collection to finance the expanded guarantee, the blanket guarantee will be pareto-inferior to the benchmark guarantee.

If the government prohibits the creation of a new representative financial firm but simultaneously guarantees the new debt issued by the holding company, the value of the guarantee will be the following:

$$V_5(s) = \max[0, r_f(1 - w_e) - a_1^*(s) + r_f - a_2(s)]. \quad (26)$$

The expected government transfer will be greater than that associated with the limited guarantee on existing debt (i.e., $V_3 > V_1$ and $V_3 > V_2$) and may be less than or greater than the expected value of the benchmark guarantee (V_0). A government guarantee on new debt of the existing holding company will lower the government's obligation relative to the benchmark case when the new project has a low variance and is negatively correlated with the existing project.

Equation (26) emphasizes the importance of the entry restriction for the expected amount of direct tax revenue that the government must raise in order to compensate the nonentrepreneur for losses produced by the new policy. Even with a blanket guarantee on new as well as old debt of the existing representative holding company, the expected fiscal cost of the guarantee may be less than that associated with allowing the entrepreneur to create a new firm to finance the new project *without* government guarantees while allowing the government to guarantee the old debt of existing firms. Ensuring the debt of both new *and* old financial firms is, of course, the worst policy for the welfare of the representative entrepreneur and nonentrepreneur.

6. Discussion

The standard approach to bank bailouts stresses the problems created by inadequate standards for bank capital, poor supervision by bank examiners, and an unwillingness of regulatory officials to close or recapitalize financial institutions that are in distress. This approach is well represented in books such as Benston *et. al.* (1986), in recent books on banking crises of the 1980s [such as White (1991) and Brock (1992)], and in the World Bank's 1989 *World Development Report* on financial systems and development. The regulatory problem addressed by the standard approach can in some circumstances be described as one of the "time inconsistency" of bank regulations: bank regulators and politicians cannot credibly precommit themselves not to bailout banks in distress, so banks take actions that lead to financial bailouts. In this view, good banking regulation in the form of capital requirements, auditing, and timely closure or recapitalization of banks serves to minimize the time consistency problem.

This paper, in contrast to the standard approach, has suggested that financial bailouts may be part of a pareto-improving transfer mechanism that is associated with a growth-creating policy reform. The model developed in the previous sections should not be interpreted as stating that *all* (or even *most*) financial

bailouts are part of an optimal transfer mechanism. It does state that a significant economic policy reform may involve government financial guarantees that, with a lag, produce a financial bailout which would normally signal poorly-designed regulatory policy in a non-growth context. This section sketches two episodes of policy reform to illustrate the potential empirical applicability of the model developed in the previous sections.

Chile, 1975-1983

In the early stages of its reforms (1975-1976) the Chilean government attempted to promote a free banking policy, in the sense of free entry and exit of banks (see de la Cuadra and Valdés 1992). The policy was abandoned at the beginning of 1977 when the government intervened to save the Banco Osorno, a mid-sized bank, and simultaneously clamped down on the unregulated financial market. From 1977 onward most observers agree that an implicit policy of deposit guarantees existed for domestic depositors. Between 1977 and 1983, entry of new financial firms was severely restricted by the government.

Beginning in 1976 the government began to encourage foreign borrowing by domestic banks under Article 14 of the Central Bank's Foreign Exchange Regulations. The capital inflows associated with Article 14 borrowing grew increasingly important to the success of the economic reforms. By 1980 the inflows reached 10 percent of GDP and then doubled to 20 percent of GDP in 1981. According to the official position of the Chilean government at the time, Article 14 guaranteed foreign lenders only the right to repatriate loan repayments at the going market exchange rate. There was no government guarantee against default.

The external interest rate and commodity price shocks that hit Chile and the rest of Latin America in the early 1980s represented a particularly adverse realization of the state of nature. On January 13, 1983 the Chilean government took over the two largest banks in the banking system and subsequently announced that the government would assume responsibility for the foreign debt of all the banks. Between 1983 and 1986 the government engaged in two global reschedulings of private sector debt and purchased large quantities of uncollectable loans from banks at par. During the period from 1985 through 1990, most of the banks' foreign debt was sold by the foreign lenders at deep discounts (at 60 to 70 percent of par) via debt buyback

mechanisms and debt-equity swaps channeled through Articles 18 and 19 of the Foreign Exchange Regulations.

In terms of the paper's model, the Chilean government's 1977 intervention accomplished two things: it limited entry into banking that was destabilizing existing banks and it provided existing banks with a mechanism for financing new projects. In the paper's closed economy model the representative nonentrepreneur provides the additional funding, while in Chile foreign banks provided the new funds. In a manner similar to the paper's model with junior secured debt, the government intervention in the financial system following 1983 bailed out (most) domestic depositors, but it also involved a write down of the value of foreign loans to banks. Foreign loans, via the debt conversion mechanisms, were effectively secured by assets of insolvent but viable firms.

The paper's model predicts that for particularly bad realizations of the state of nature the government will have to exercise a put option written by the representative nonentrepreneur. In an open economy, such a put option can be written by foreigners or international lending organizations (and paid for by appropriate premiums associated with the option). In 1983 the Chilean government was unable to finance the entire financial bailout out of current tax revenue and relied on stabilization loans from the IMF and World Bank to fund a portion of the initial transfer. In addition, the Central Bank assumed the responsibility for financing a large part of the transfer, and still holds \$3.8 billion (about 13 percent of GDP) of debt associated with the bailout. This latter aspect of the bailout involves the smoothing of tax collections over many years by the Chilean government, a possibility that does not fall naturally out of the two-period framework of the model.

With reference to the standard approach to banking crises, there is much evidence that banking supervision was lax in Chile at least until the beginning of 1981. Nevertheless, de la Cuadra and Valdés (1992) find no evidence of rampant moral hazard (e.g., investment in overly risky projects) in the Chilean banking system prior to the external shocks of 1981 and 1982. Such evidence suggests that from 1977 through mid-1981 government restrictions on entry into the banking system plus limits on the total amount foreign borrowing created a positive charter value for banks. This positive charter value -- in combination with the government's treatment of foreign loans to the banking system as junior secured debt -- gave the

banks the appropriate incentives to invest in new projects that have been the basis of the successful growth of the Chilean economy since the mid-1980s.

Japan, 1872-81

During the early years of the Meiji restoration (1868-1876), the Meiji government faced two problems: a lack of private investment and a fiscal burden associated with the payment of stipends to the *samurai*, a burden that absorbed half of the government's tax revenue between 1871 and 1875 (Beasley 1972, p. 381). The lack of private investment was connected to the fragility of financial institutions. In 1874 a number of major merchants went bankrupt, and in March 1875 the four existing national banks asked the government for assistance (Shibusawa 1910, p. 500). In order to rescue the banks, the government purchased all of the depreciated bank notes at par in exchange for inconvertible government notes during the year following the request for assistance.

In response to the joint problems of the *samurai* stipends and the banks, the government implemented two interlinked policies. In August 1876 bank regulations were changed to permit the composition of bank capital to be 80 percent government bonds and 20 percent specie (rather than the 60/40 split prior to the change). One month later *samurai* stipends were commuted into government bonds. The express purpose of the two policies was to reduce and to convert the government's obligation to the *samurai* into a form that would encourage private sector investment. Smith (1955, pp. 33-34) summarizes well the intent of the government's policy:

Since the *samurai* problem was essentially economic, it called for an economic solution, as every government document on the problem stressed. There were but two possible economic solutions, broadly speaking: either the government had to support the *samurai* as it had in the past on a kind of dole, or it had to expand the economy sufficiently to make room for them as producers. The first of these alternatives was not seriously considered since it would have saddled the government with a terrible financial burden and forced it to abandon the ambitious program of modernization to which it was fully committed; expansion of the economy, on the other hand, was not only compatible with this program but essential to it. Solution of the *samurai* problem, therefore, was constantly linked in official memoranda with industrial and agricultural development, particularly the former.

Table 5 shows the great increase in the number of banks and in bank capital following the 1876 reform. The contribution of the new banks to Japan's economy appears to have been favorable. Patrick

(1967, p. 259) concludes that "they [the national banks] made modern banking, and, by extension, modern enterprise generally, a highly respectable and even prestigious occupation; this probably resulted in part from continuing general respect for the nobility and samurai."

In terms of this paper's model, the Meiji reforms of 1876 were most like the benchmark model of free entry with no government guarantee on new debt. However, unlike the benchmark model, the 1876 government bailout occurred *before* the growth of new banks rather than after. Given the small number of banks, this may have been an attractive way to put old banks on an equal footing with the new banks for new lending (in the benchmark model old firms do not make new loans). Another difference between the Meiji reforms and the paper's model concerns the treatment of nonentrepreneurs. Whereas the division between entrepreneurs and nonentrepreneurs is a fixed element of the model, the Meiji government's compensation policy toward the *samurai* encouraged them to become entrepreneurs by making entry into banking easy for them. The government bonds used by the *samurai* to establish new banks were secured by the cash flows of new loans and were not given a government guarantee, just as in the benchmark model.

7. Conclusion

The theory of secured debt issue by firms emphasizes that a viable explanation of secured debt cannot keep the investment policy of a firm fixed. With a fixed investment policy, as assumed in the Modigliani-Miller (1958) and Fama-Miller (1972) models, the unexpected issue of secured debt transfers wealth away from existing debtholders and toward firm share-holders. As a result, debt covenants written to protect existing debtholders will in equilibrium prohibit the issue of secured debt. It is only when a firm has new profitable investment opportunities that secured debt serves a function. Without the ability to issue secured debt to finance new investments, the conflict between existing bondholders and shareholders will cause shareholders to forego some positive present value projects due to the underinvestment problem.

In a way that is similar to the theory of secured debt issue, unexpected policy changes in this paper transfer wealth away from existing debtholders and toward entrepreneurs. The assumed constitutional safeguard of this paper that requires the government to compensate agents for financial losses produced by policy reforms assures that in equilibrium investment in the original project takes place. Like the theory of

secured debt issue by firms, the paper's explanation of government policy toward old and new private sector debt is not a viable theory when the investment opportunities of a country are held fixed. It is the presence of new investment options following an economic reform that creates the role for the use of secured debt by firms or for government guarantees on new private sector debt.

A striking feature of the two cases of policy reform sketched in this paper -- apart from the concerted efforts of both governments to influence the debt structure of the banking systems -- is the central role that economic *growth* played in the rhetoric of the political regimes. The Meiji government adopted the slogan "enrich the country, strengthen the army" (Beasley 1972, p. 379) while the Chilean government embraced a policy of "the seven modernizations" to transform the Chilean economy. It is to these growth environments that this paper's interpretation of the function of government guarantees and financial bailouts applies.

As mentioned at the outset, the paper's model has not included asymmetric information between lenders and borrowers, moral hazard, collateral, or monitoring mechanisms that play central roles in a number of recent models of banks in a macroeconomic setting [e.g., Diamond and Dybvig (1983), Williamson (1987), Jacklin and Bhattacharya (1988) and Bernanke and Gertler (1989, 1990)]. The contracting constraints associated with the existence of asymmetric information between borrowers and lenders provide additional reasons for some types of entry restrictions to create charter value for banks, the use of junior secured debt, and much attention to prudential regulation following economic reforms. Unlike the model in the paper, financial bailouts are not costless due essentially to problems of asymmetric information.

The primary message of this paper is *not* that prudential bank regulations should be ignored during policy reforms. If anything, bank supervision and monitoring capabilities must be strengthened if a government is to successfully pursue the financial policies outlined in the paper. Without strong prudential supervision, the presence of asymmetric information may permit excessive risk taking, as shown in Section 4. The message of the paper is also *not* that fiscal reform should be ignored at the outset of a policy reform. In both Meiji Japan and Chile the governments undertook major fiscal reforms in order to improve tax collection and to alter the tax structure to create smaller economic distortions. Lowering the deadweight cost of tax collection may well be a prerequisite for a government's ability to credibly offer the financial

guarantees modeled in this paper. The paper's primary message is that a financial bailout may be a lagging indicator of a successful policy to offer financial guarantees to potential losers in order to create political support for an economic reform.

Appendix: The Government's Put Option Associated with the Debt Guarantee

For any state of the world s , the government's budget constraint is the following:

$$V_0(s) + p[V_0(s), T_0(s)] = (1 - \gamma)T_0(s) + \max[0, V_0(s) - (1 - \gamma)T_0(s)]. \quad (\text{A.1})$$

In "bad" states of the world $p[V_0(s), T_0(s)] = 0$ and in "good" states of the world $\max[0, V_0(s) - (1 - \gamma)T_0(s)] = 0$. Let the states of the world in which the government exercises the put option (i.e., the bad states) be ordered from 0 to \hat{s} and those states in which the government does not exercise the put option (i.e., the good states) be ordered from \hat{s} to \bar{s} . Risk neutrality and the government's budget constraint implies that the market value in period one of the put option, $P(V_0, T_0)$, will satisfy the following two equalities:

$$\int_{\hat{s}}^{\bar{s}} [(1 - \gamma)T_0(s) - V_0(s)] f(s) ds = \int_{\hat{s}}^{\bar{s}} p[V_0(s), T_0(s)] f(s) ds = P(V_0, T_0) \quad (\text{A.2})$$

$$\int_0^{\hat{s}} [(1 - \gamma)T_0(s) - V_0(s)] f(s) ds = - \int_0^{\hat{s}} \max[0, V_0(s) - (1 - \gamma)T_0(s)] f(s) ds = -P(V_0, T_0). \quad (\text{A.3})$$

Equation (A.2) states that the expected value of the premiums paid by the government to the representative nonentrepreneur will equal the expected excess of taxes relative to transfers in good states of the world in the second period. Equation (A.3) states that the expected fiscal shortfall in bad states of the world in the second period will be equal to the expected payment to the government by the representative nonentrepreneur. The market price of the put option will equate the expected value of the premia in good states of the world in the second period with the expected value of the fiscal shortfall in bad states, thereby generating the following equality between expected tax revenue (net of the cost of tax collection) and expected transfers across all states of the world:

$$\int_0^{\bar{s}} [(1 - \gamma)T_0(s) - V_0(s)] f(s) ds = 0. \quad (\text{A.4})$$

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Table 1
The Original Firm's Balance Sheet
with a Government Guarantee on Old Debt

Assets	Liabilities
$\int_0^{\bar{s}} a_1^*(s) f(s) ds$ $\int_0^{\bar{s}} V_0(s) f(s) ds =$	$r_f(1 - w_e)$
$\int_0^{\bar{s}} \max[0, r_f(1 - w_e) - a_1^*(s)]$ $\cdot f(s) ds$	Net Worth $q_0 w_e =$ $\int_0^{\bar{s}} \max[a_1^*(s) - r_f(1 - w_e), 0] f(s) ds$

Table 2
No Guarantee on New Debt

Assets	Liabilities
$\int_0^{\bar{s}} a_1^*(s) f(s) ds$	$r_f(1 - w_e)$
$\int_0^{\bar{s}} a_2(s) f(s) ds$	$\int_0^{\bar{s}} \min\{r_n, A_1[a_1^*(s) + a_2(s)]\} f(s) ds$
	$= r_f$
$\int_0^{\bar{s}} V_1(s) f(s) ds$	<p>Net Worth</p> <p>$q_1 w_e =$</p> $\int_0^{\bar{s}} \max\{(1 - A_1)[a_1^*(s) + a_2(s)] - r_f(1 - w_e), 0\}$ $+ \int_0^{\bar{s}} \max\{A_1[a_1^*(s) + a_2(s)] - r_n, 0\}$

Note:

$$(q_1 - q_0)w_e = \int_0^{\bar{s}} a_2(s) f(s) ds - r_f - \int_0^{\bar{s}} [V_0(s) - V_1(s)] f(s) ds \geq 0$$

Table 3
Firm Can Add Risk to New Project

Assets	Liabilities
$\int_0^{\bar{s}} a_1^*(s) f(s) ds$	$r_f(1 - w_e)$
$\int_0^{\bar{s}} a_2^*(s) f(s) ds - C$	$\int_0^{\bar{s}} \min\{r_n^*, A_2[a_1^*(s) + a_2^*(s) - C]\} \bullet f(s) ds = r_f$
$\int_0^{\bar{s}} V_2(s) f(s) ds$	Net Worth $q_2 w_e$

Note:

$$(q_2 - q_1)w_e = \int_0^{\bar{s}} [V_2(s) - V_1(s)] f(s) ds - C \geq 0$$

Table 4
New Debt Secured by New Projects

Assets	Liabilities
$\int_0^{\bar{s}} a_1^*(s) f(s) ds$	$r_f(1 - w_e)$
$\int_0^{\bar{s}} a_2(s) f(s) ds$	$\int_0^{\bar{s}} \min[r_{sj}, a_2(s)] f(s) ds$
	$= r_f$
$\int_0^{\bar{s}} V_3(s) f(s) ds$	Net Worth
	$q_3 w_e$

Note:

$$(q_3 - q_0)w_e = \int_0^{\bar{s}} a_2(s) f(s) ds - r_f - \int_0^{\bar{s}} [V_0(s) - V_3(s)] f(s) ds$$

Table 5
Number, Total Paid-In Capital, and Average Capital of National Banks
in Japan, 1873-1880
(capital in thousand yen)

Year End	Number	Total Capital	Average Capital
1873	1	2,441	2,441
1874	4	3,432	858
1875	4	3,450	863
1876	5	2,350	470
1877	26	22,986	406
1878	95	33,596	168
1879	151	40,616	152
1880	151	43,041	168

Source: Patrick (1967), p. 248

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